Mid Term Report

A Contemporary Concern Study on the

Behavioural Aspects of Financial Analysts

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Introduction

The world of analysts and investors is full of numbers and models used for decision-making. But the decision-makers are human beings. So it is likely that some biases do creep in the predictions of analysts as well as in the decisions by the investors. Behavioural Finance tries to capture this aspect.

Various researchers have studied whether any bias exists in recommendation of analysts and different aspects of such biases of analysts. In "Tracking Analysts' Forecasts over the Annual Earnings Horizon: Are Analysts' Forecasts Optimistic or Pessimistic?" Scott A. Richardson, Siew Hong Teoh and Peter David Wysocki record their observation that analysts put up an optimistic earnings forecast at the beginning of the year and walk down it through out the year. The estimate just before the earnings announcement tends to be slightly pessimistic so that on earnings announcement the investors get a pleasant surprise.

The extent of such a walkdown in earnings estimate would also depend on various characteristic of the analyst firm, e.g. size of the analyst firm.

Also, logic suggests that the accuracy of the forecast of analyst should improve as the date of actual earnings announcement approaches. This would happen because of availability of more information. However, the pattern of improvement of earnings forecast might differ depending upon characteristics of analyst firm.

OBJECTIVE

To find out, based on empirical evidence

1. How the walkdown in earnings estimate varies for large and small analyst firms.
2. How the earnings forecast accuracy improves and whether it differs for large and small analyst firms.

METHODOLOGY

We used the published research papers on behavioural aspects of analysts to understand biases in the behaviour of analysts. We used data from I/B/E/S as our secondary source of data. We currently have an I/B/E/S CD-ROM dated March 1997, containing:

1. Earnings estimate published by analysts for various firms for a number of years
2. Actual earnings of the firms analysed for the analysts.

We used statistical tools for analysis of the data to test the hypotheses whether walkdown in earnings estimate and improvement in earnings estimate vary for large and small analyst firms.

We plan to contact security analysts who would be able to throw some light on the explanation behind particular patterns in the analysts' estimation.

CURRENT STATUS

These hypotheses have been tested, and their results documented below.

Walkdowns

We tested the following hypotheses

- Analyst walkdown their forecasts as the earnings announcement dates approach.
- There is a significant difference between walkdown by small and large brokerage houses.

DEFINITIONS

Walkdown

Reduction in difference (with sign) between forecasted earnings and actual earnings.

For each stock, zero or more analysts estimate the expected earnings per share at a time T (typically the year end). These estimates made be made at various times (t) and could be revised over a period. We define the forecast error an analyst makes at a time t in estimating the earnings of a stock at time T as error(t,T)

$$error(t,T) = \frac{estimate(t,T) - actual(T)}{actual(T)}$$

$$walkdown(T) = \frac{error(\min(t),T) - error(\max(t),T)}{\max(t) - \min(t)}$$

The walkdown is the difference between the earliest and the latest errors, on a per-day basis, *for a given analyst covering a given stock*. The earliest and latest differences are considered only within one year before the earnings announcement. Differences greater than 200% are ignored to eliminate outliers. Thus there is one measure of walkdown for each earnings announcement and analyst combination.

Large brokerage house

A brokerage house having analysts more than the median number of analysts.

Small brokerage house

A brokerage house having analysts more than the median number of analysts.

METHODOLOGY

1. Walkdown is calculated for each combination of earnings announcement and analyst.
2. Mean, standard deviation and standard error is calculated for this sample.

3. The sample is divided into two parts, large brokerage houses and small brokerage houses. Mean, standard deviation and standard error is calculated for each of these samples.
4. Hypotheses are tested whether walkdown in each of the sample is significant.
5. Hypothesis is tested whether walkdown is significantly different for large and small brokerage houses by doing a "Difference in means" tests.

RESULTS

Following table summarizes the results.

Type	Mean Walkdown	Std Err	z-value	No of broker houses
Small	0.000842677	0.000199347	4.2272	560
Large	0.000805427	0.000069976	11.5100	560
Total	0.000812978	0.000068888	11.8014	1120
Difference in means	0.000037250	0.000211272	0.1763	

Since the z-values for all the three samples are significantly higher than the z-value at 0.01, we conclude at 99% confidence level that the walkdown in the forecasts of analysts is significant. Since the z value for difference in means is significantly lower than the z-value at 0.01, we conclude at 99% confidence level that the difference in walkdowns in the forecasts of analysts belonging to large and small brokerage houses is not significant.

CONCLUSION

1. Analysts walkdown their forecasts significantly.
2. Analysts' forecasts tend to drop by about 0.0008% every day, or about 0.074% a quarter.
3. Analysts belonging to small as well as large brokerage houses walkdown their forecasts significantly.
4. Walkdown in the forecasts by large brokerage houses is not significantly different from that by small brokerage houses.

HOW IS IT USEFUL?

Using this data, investors can

- ❖ Discount the bias towards high earnings estimates at the beginning of the year.
- ❖ Discount the bias towards low earnings estimates at the end of the year.
- ❖ Quantify the extent of this 'walkdown' phenomenon when analysts revise their earnings estimates (0.074% per quarter).

Directions

- Richardson [6] performs a similar analysis in greater detail. We intend to introduce more controls in our study based on his paper.
- Rather than use our definition of walkdown, which ignores a lot of data points, we intend to refine the definition to permit regression analysis on all data points.
- We discovered that there is no significant difference in the *mean* of walkdowns between large and small brokers. Does that hold for the *standard deviations* as well? If it does not, then the volatility in walkdowns would differ by size of the firm.
- Just as the data was classified by the size of the brokerage firm, we will classify it by the number of analysts following a company, and test whether
    - Largely followed companies have larger or smaller walkdowns, and whether
    - Largely followed companies have larger or smaller volatility of walkdowns.

Forecast Accuracy

We tested the following hypotheses

- The accuracy of forecasts of the analysts improves as the earnings announcement date approaches.
- There is a significant difference between improvement achieved by small and large brokerage houses.

DEFINITIONS

Improvement

Reduction in absolute error in forecasting.

For each stock, zero or more analysts estimate the expected earnings per share at a time T (typically the year end). These estimates made be made at various times (t) and could be revised over a period. We define the absolute error an analyst makes at a time t in estimating the earnings of a stock at time T as absError(t,T)

$$absError(t,T) = \left| \frac{estimate(t,T) - actual(T)}{actual(T)} \right|$$

$$improvement(T) = \frac{absError(\min(t),T) - absError(\max(t),T)}{\max(t) - \min(t)}$$

The improvement is the difference between the earliest and the latest errors, on a per-day basis, *for a given analyst covering a given stock*. The earliest and latest errors are considered only within one year before the earnings announcement. Errors greater than 200% are ignored to eliminate outliers. Thus there is one measure of improvement for each earnings announcement and analyst combination.

Large brokerage house

A brokerage house having analysts more than the median number of analysts.

Small brokerage house

A brokerage house having analysts more than the median number of analysts.

METHODOLOGY

1. Improvement is calculated for each combination of earnings announcement and analyst.

2. Mean, standard deviation and standard error is calculated for this sample.
3. The sample is divided into two parts, large brokerage houses and small brokerage houses. Mean, standard deviation and standard error is calculated for each of these samples.
4. Hypotheses are tested whether improvement in each of the sample is significant.
5. Hypothesis is tested whether improvement is significantly different for large and small brokerage houses by doing a "Difference in means" tests.

RESULTS

Following table summarizes the results.

Type	Mean Improvement	StdErr	z-value	No of broker houses
Small	0.001457448	0.0001601	9.10499	560
Large	0.001551604	0.0000582	26.64505	560
Total	0.001532517	0.0000566	27.05565	1120
Difference in means	0.000094156	0.0001703	0.55277	

Since the z-values for all the three samples are significantly higher than the z-value at 0.01, we conclude at 99% confidence level that the improvement in the forecasts of analysts is significant. Since the z value for difference in means is significantly lower than the z-value at 0.01, we conclude at 99% confidence level that the difference in improvements in the forecasts of analysts belonging to large and small brokerage houses is not significant.

CONCLUSION

1. Accuracy of earnings forecasts by analysts improves significantly.
2. Analysts' forecasts improve by about 0.0015% every day, or about 0.13% a quarter.
3. Accuracy of earnings forecasts by analysts belonging to small as well as large brokerage houses improves significantly.
4. Improvement in accuracy for large brokerage houses is not significantly different from that for small brokerage houses.

UTILITY

Using this data, investors can

- Discount the large error at the beginning of the year.
- Quantify the extent of error improvement when analysts revise their earnings estimates (0.13% per quarter).

Directions

- Richardson [6] performs a similar analysis in greater detail. We intend to introduce more controls in our study based on his paper.
- Rather than use our definition of improvement, which ignores a lot of data points, we intend to refine the definition to permit regression analysis on all data points.
- We discovered that there is no significant difference in the *mean* of improvement between large and small brokers. Does that hold for the *standard deviations* as well? If it does not, then the volatility in error improvement would differ by size of the firm.
- Just as the data was classified by the size of the brokerage firm, we will classify it by the number of investors following a company, and test whether
    - Largely followed companies have larger improvements, and whether
    - Largely followed companies have larger volatility of improvements.

Further Research

We are looking into the following hypothesis:

1. What is the pattern of walkdown and forecast improvement with time? Specifically, is the walkdown and/or improvement convex or concave?
2. Does the length of time an analyst has been covering a particular stock improve the analyst's accuracy? In other words, is there a 'learning curve' effect? If so, how much?
3. A related question is, does the length of time a *broker house* has been covering a particular stock improve the house's accuracy? In other words, is there institutional knowledge over and above individual knowledge? If so, how much?
4. If an analyst leaves a broker house, does the house's forecast accuracy suffer significantly? If so, how much?

Richardson has performed an analysis similar to the first. We do not know of any literature covering the remaining hypotheses. The last three hypotheses help partly value the worth of an analyst to a broker house, as well as the institutional 'knowledge capital'.

We hope to analyze the causes of these behavioural patterns by interviewing analysts. However, insufficient access to analysts may hamper this step.

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